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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/597,799

Applicant(s)

TANAKA ET AL.

Examiner

JESSICA TREIDL

Art Unit

1796

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 September 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 4 and 6-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 4 and 6-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date 07/15/2008
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 4 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rowe et al (US 4,447,512).

Regarding claim 1, Rowe et al teach a photosensitive resin composition (Abstract, C2/L52-53) comprising a resin (A) soluble in an aqueous alkaline solution (Abstract, see aqueous alkali- sensitive substance & C4/L11-12), a crosslinking agent

(B) (C4/L13-19 see organic acid reacts with epoxylated resin), a photopolymerization initiator (C) (C5/L40-45 & C5/L59-C6/L2), and a curing agent (D) (C3/L65-68 & C2/L58-C3/L19). Furthermore the reference teaches the curing agent to be 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane, a commercially available version sold as Epon 1031 (C3/L15-19).

The curing agent limitation (wherein the curing agent (D) is an epoxy compound obtained by glycidylating a compound containing not less than 80% of a tetraphenylethane derivative represented by recited formula (1)), is a product-by-process limitation, patentability of said limitation is based on the recited product and does not depend on its method of production. Since the product of the curing agent limitation is the same as product disclosed by Rowe et al (1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane 3:16), and Rowe et al teach the product as the curing agent (thereby the curing agent comprising 100% of the compound), the claim is unpatentable even though the Rowe et al product may have been made by a different process. In re Marosi, 710 F2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). See MPEP 2113. Furthermore, when the curing is agent is 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane, the curing agent contains 100 mol % 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane.

Regarding, the epoxy equivalence, Rowe et al teach the epoxy equivalence of Epon1031 to be 210.240 and do not explicitly teach the epoxy equivalence of 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane (though it is calculated to be ~156 g/equiv). Should one choose to use Epon 1031, instead of simply the 1,1,2,2-tetrakis [(2,3-

epoxypropoxy)phenyl] ethane compound as taught (3:16), it would be within the skill of one of ordinary skill in the art to further purify Epon 1031 before using in the photosensitive composition to remove any impurities, including chemicals added for transportation or storage stability and synthesis by-products. As Epon 1031 is purified to contain substantially 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane, its epoxy equivalent will reduce to be substantially close to 156 g/eq, see response to arguments below.

Regarding the transmittance at 400 nm in a 1 weight percent methyl ethyl ketone solution, although the transmittance of Epon 1031 does not meet this limitation (specification 40:11-17), it would have been obvious to one of ordinary skill in the art to purify the commercial product before using in the photosensitive composition to remove any impurities, including chemicals added for transportation or storage stability and synthesis by-products. As well, Rowe et al teach the curing agent being 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane, the compound, therefore having 100% purity. Wherein the curing agent is 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane or a purified version of Epon 1031, this property would implicitly be achieved by the purified compound, see response to arguments below.

Regarding claim 4, Epon 1031 has a melting point of 77.2 to 82.8°C, as evidenced by Hexion MSDS Epon Resin 1031, wherein 50% of the composition is melted at 80 °C, thereby anticipating the claim. Furthermore wherein Epon 1031 is further purified or the compound 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane is

used, the compound would implicitly achieve a melting point/softening point of not less than 80 °C, see response to arguments below.

Regarding claims 8-10, Rowe et al teach a cured product of the photosensitive resin composition, a substrate comprising a layer composed of the cured product, and an article comprising the substrate (C6/L26 the product is cured; C6/L8-26 wherein the product is on a substrate (C6/L13-17 see materials), and the substrate is part of a printing plate (C6/L19-26).

Claims 1, 4, 6 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nojima et al (US 6,399,277).

Regarding claim 1, Nojima et al teach a photosensitive resin composition (Abstract, C4/L26) comprising a resin (A) soluble in an aqueous alkaline solution (C4/L28-29 & C3/L44-46), a crosslinking agent (B) (C4/L33 see setting adhesion – imparting agent, acts as crosslinker C14/L51), a photopolymerization initiator (C) (C4/L32), and a curing agent (D) (C4/L34 see epoxy group-containing compound). Furthermore the reference teaches the curing agent to be the commercially available product YDG-414 (C14/L20).

The curing agent limitation (wherein the curing agent (D) is an epoxy compound obtained by glycidylating a compound containing not less than 80% of a tetraphenylethane derivative represented by recited formula (1)), is a product-by-process limitation, patentability of said limitation is based on the recited product and does not depend on its method of production. Since the product of the curing agent

limitation is the same as product disclosed by Nojima et al and Nojima et al teach the product as the curing agent, the claim is unpatentable even though the Nojima et al product may have been made by a different process. In re Marosi, 710 F2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). See MPEP 2113.

Regarding the limitation drawn to the curing agent containing 60 mol % of the compound of instant formula (2), it is not clear how much of the compound YDG-414 comprises, however, it would have been obvious to and within the skills of one of ordinary skill in the art to purify the commercial product YDG-414 before using in the photosensitive composition to remove any impurities, including chemicals added for transportation or storage stability and synthesis by-products. Resulting in a more pure 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane, leading to a curing agent having a mol % of greater than 60, an epoxy equivalent substantially close to 156 g/equivalent (wherein the epoxy equivalent of 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane is 156 g/eq) and implicitly having an transmittance of not less than 10 % in a 1 weight percent methyl ethyl ketone solution, see response to arguments below.

Regarding claim 4, Nojima et al do not teach the melting point/softening point of YDG-414. However, it would have been obvious to and within the skills of one of ordinary skill in the art to purify the commercial product YDG-414 before using in the photosensitive composition to remove any impurities, including chemicals added for transportation or storage stability and synthesis by-products. Furthermore wherein YDG-414 is further purified the compound would implicitly achieve a melting point/softening point of not less than 80 °C, see response to arguments below.

Regarding claim 6, Njoima et al teach the photosensitive resin composition (C4/L35 see active energy ray-setting resin & prepolymer (b-1) C4/L43-48), wherein the resin (A) soluble in the aqueous alkaline solution is a reaction product between an epoxy carboxylate compound obtained by reaction of an epoxy compound (a) having two or more epoxy groups per molecule (C4/L44 see novolak type epoxy compound, specifically C10/L15-46) with a monocarboxylic acid (b) having an ethylenic unsaturated group per molecule (C4/L45-46 see α,β -unsaturated carboxylic acid), and a polybasic acid anhydride (c) (C4/L48 see polybasic acid anhydride).

Regarding claims 8-10, Nojima et al teach a cured product of the photosensitive resin composition, a substrate comprising a layer composed of the cured product, and an article comprising the substrate (C27/L53-65, wherein the resin is cured with UV light C27/L60, the substrate is the patterned copper-clad laminate board C27/L56 and the article is the solder resist C27/L53).

Claims 1, 4, and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al WO/2002/094904 (see NPL English translation) in view of Rowe et al (US 4,447,512).

Regarding claim 1, Tanaka et al teach a photosensitive resin composition comprising a resin (A) soluble in an aqueous alkaline solution, a crosslinking agent (B), a photopolymerization initiator (C), and a curing agent (D) (P10/¶5). Furthermore the reference teaches the curing agent to be an epoxy compound (P28/¶2) containing phenol groups (P29/¶2 see phenol novolak, naphthalene, and

trihydroxyphenylmethane). The reference does not teach the curing agent (D), wherein the curing agent (D) is an epoxy compound obtained by glycidylating a compound containing not less than 80% of a tetraphenylethane derivative represented by recited formula (1).

Rowe et al disclose a photosensitive resin composition (Abstract, C2/L52-53) comprising a resin (A) soluble in an aqueous alkaline solution (Abstract, see aqueous alkali-sensitive substance & C4/L11-12), a crosslinking agent (B) (C4/L13-19 see organic acid reacts with epoxylated resin), a photopolymerization initiator (C) (C5/L40-45 & C5/L59-C6/L2), and a curing agent (D) (C3/L65-68 & C2/L58-C3/L19). Furthermore the reference teaches the curing agent to be 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane, commercially available as Epon 1031 (C3/L15-19). Finally, the reference teaches the composition, containing an O-epoxyalkylate tetrakis (hydroxyl phenyl) alkane resin such as 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl], to have a long pot life (C2/L52-66). Tanaka et al and Rowe et al disclose analogous photosensitive resin compositions containing aqueous alkaline solutions and epoxy curing agents. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the curing agent of Rowe et al, 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane, commercially available as Epon 1031, in place of the epoxy curing agent of Tanaka et al to increase the pot life of the composition.

The curing agent limitation (wherein the curing agent (D) is an epoxy compound obtained by glycidylating a compound containing not less than 80% of a tetraphenylethane derivative represented by recited formula (1)), is a product-by-

process limitation, patentability of said limitation is based on the recited product and does not depend on its method of production. Since the product of the curing agent limitation is the same as product disclosed by Rowe et al (1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane 3:16), and Rowe et al teach the product as the curing agent (thereby the curing agent comprising 100% of the compound), the claim is unpatentable even though the Rowe et al product may have been made by a different process. In re Marosi, 710 F2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). See MPEP 2113. Furthermore, when the curing is agent is 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane, the curing agent contains 100 mol % 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane.

Regarding, the epoxy equivalence, Rowe et al teach the epoxy equivalence of Epon1031 to be 210.240 and do not explicitly teach the epoxy equivalence of 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane (though it is calculated to be ~156 g/equiv). Should one choose to the use Epon 1031, instead of simply the 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane compound as taught (3:16), it would be within the skill of one of ordinary skill in the art to further purify Epon 1031 before using in the photosensitive composition to remove any impurities, including chemicals added for transportation or storage stability and synthesis by-products. As Epon 1031 is purified to contain substantially 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane, its epoxy equivalent will reduce to be substantially close to 156 g/eq, see response to arguments below. Regarding the transmittance at 400 nm in a 1 weight percent methyl ethyl ketone solution, although the transmittance of Epon 1031 does not meet this limitation

(specification 40:11-17), it would have been obvious to one of ordinary skill in the art to purify the commercial product before using in the photosensitive composition to remove any impurities, including chemicals added for transportation or storage stability and synthesis by-products. As well, Rowe et al teach the curing agent being 1,1,2,2-tetrakis [(2,3-epoxypropyl)phenyl] ethane, the compound, therefore having 100% purity. Wherein the curing agent is 1,1,2,2-tetrakis [(2,3-epoxypropyl)phenyl] ethane or a purified version of Epon 1031, this property would implicitly be achieved by the purified compound, see response to arguments below.

Regarding claim 4, Epon 1031 has a melting point of 77.2 to 82.8°C, as evidenced by Hexion MSDS Epon Resin 1031, wherein 50% of the composition is melted at 80 °C, thereby anticipating the claim. Furthermore wherein Epon 1031 is further purified or the compound 1,1,2,2-tetrakis [(2,3-epoxypropyl)phenyl] ethane is used, the compound would implicitly achieve a melting point/softening point of not less than 80 °C, see response to arguments below.

Regarding claim 7, Tanaka et al teach the photosensitive resin composition, wherein the resin (A) soluble in the aqueous alkaline solution is a reaction product between an epoxy carboxylate compound obtained by reaction of an epoxy compound (d) having two epoxy groups per molecule with a monocarboxylic acid (b) having an ethylenic unsaturated group per molecule, a diisocyanate compound (e), a carboxylic acid (f) having two hydroxyl groups per molecule, and, as an optional component, a diol compound (g) (P5, entire page).

Regarding claims 8-10, Tanaka et al teach a cured product of the photosensitive resin composition, a substrate comprising a layer composed of the cured product, and an article comprising the substrate (P10¶6-P11¶12).

Response to Arguments

Regarding Applicant's argument that Epon 1031 has an epoxy equivalent of 195-230 g/eqv and therefore does not teach the amended epoxy equivalent range of 155 to 180 g/equivalent, it would have been well within the skill of one of ordinary skill in the art to purify the commercial product Epon-1031 before using in the photosensitive composition to remove any impurities, including chemicals added for transportation or storage stability and synthesis by-products. Furthermore the reference does not teach Epon 1031 solely, but instead teaches the curing agent being 1,1,2,2-tetrakis [(2,3-epoxypropyl)phenyl] ethane (C3/L15-19), wherein Epon 1031 is merely a suggested commercially available version. 1,1,2,2-tetrakis [(2,3-epoxypropyl)phenyl] ethane has an epoxy equivalent of ~156. Additionally, one would have been additionally motivated to purify Epon 1031, as the reference teaches the curing agent being 1,1,2,2-tetrakis [(2,3-epoxypropyl)phenyl] ethane, not a mixture of impurities, by-products and 1,1,2,2-tetrakis [(2,3-epoxypropyl)phenyl] ethane. As Epon 1031 is purified to contain substantially 1,1,2,2-tetrakis [(2,3-epoxypropyl)phenyl] ethane, its epoxy equivalent will reduce to be substantially close to 156 g/eq, as the specification teaches curing agents containing only 74 % and 87 % 1,1,2,2-tetrakis [(2,3-epoxypropyl)phenyl] ethane having an epoxy equivalent of 170 and 165 g/eq respectively (Syn. Ex. 3 and 4).

Additionally it is noted that as Epon 1031 is purified to contain substantially 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane it will implicitly achieve a transmittance at 400 nm of not less than 10 % in a 1 weight percent methyl ethyl ketone solution, as the specification provides an example of a curing agent comprising 87 % 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane and possessing greater than 99 % transmittance (Syn Ex 4). Furthermore wherein Epon 1031 is further purified or the compound 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane is used, the compound would implicitly achieve a melting point/softening point of not less than 80 °C, as the specification teaches curing agents comprising only 74 % and 87 % 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane having a softening point of 81.4 °C and a melting point of 174 °C respectively (Syn Ex 3 and 4). Lastly, although the Applicant demonstrates that compositions comprising Epikote 1031S and Tepic as the curing agent do not possess all of the desired properties of the composition (Table 2), these results do not clearly indicate the criticality of having at least 60 mol % of the compound of formula (2), as it is not clear if the deficiencies of Epikote 1031S and Tepic are the result of the amount or the type of impurities.

Regarding Applicant's argument that the curing agent, YDG-414, of Nojima et al does not have a light transmittance at 400 nm of not less than 10 % in a 1 weight percent methyl ethyl ketone solution, as stated by the instant specification P 40, it would have been obvious to and within the skills of one of ordinary skill in the art to purify the commercial product YDG-414 before using in the photosensitive composition to remove any impurities, including chemicals added for transportation or storage stability and

synthesis byproducts. As YDG-414 is purified to contain in a substantial majority of 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane, the curing agent would implicitly achieve a transmittance of not less than 10 % at 400 nm in a 1 weight percent methyl ethyl ketone solution, as the specification provides an example having only 87 % instant formula 2 and possessing greater than 99 % transmittance (syn ex 4).

Regarding Applicant's argument that Epikote 1031S, like YDG-414, has a light of transmittance of 0.0 % at 400 nm in a solution of 0.1 weight percent methyl ethyl ketone solution, and that the use of high-purity 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl]ethane as the curing agent produces superior results over the use of Epikote 1031S, it is unclear if Epikote 1031 S is analogous to Epon 1031, and it is noted that the features upon which applicant relies (i.e., superior results) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). If Applicant intended to assert that Epikote 1031S and Epon 1031 are equivalent, and that therefore Epon 1031 fails to meet the limitation of having a light transmittance of not less than 10% at 400 nm in a 1 weight percent methyl ethyl ketone, it is noted that it would have been well within the skill of one of ordinary skill in the art to purify the commercial product Epon-1031 before using in the photosensitive composition to remove any impurities, including chemicals added for transportation or storage stability and synthesis byproducts. Additionally, one would have been additionally motivated to purify Epon 1031, as the reference teaches the curing agent being 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl]

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ethane, not a mixture of impurities, byproducts and 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane. Upon purification such that Epon 1031 contains substantially 1,1,2,2-tetrakis [(2,3-epoxypropoxy)phenyl] ethane, the curing agent would implicitly achieve a light transmittance of not less than 10% at 400 nm in a 1 weight percent methyl ethyl ketone, as the speciation provides an example having only 87 % instant formula 2 and possessing greater than 99 % transmittance, (Syn Ex 4).

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JESSICA TREIDL whose telephone number is (571)270-3993. The examiner can normally be reached on Monday- Thursday, 7:30AM- 5PM EST, Alt. Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Eashoo can be reached on (571) 272-1197. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J.T./
/12.16.08/

/Sanza L McClendon/

Primary Examiner,

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